

Conclusions: We found that leaflets stress is dependent on the internal diameter of the inflated TAV. TAV oversizing induced localized high stress regions within the leaflets which may lead to premature tissue failure.

TCT-674

A novel way to calculate the line of perpendicularity and suitable angulations in TAVI by CT analysis

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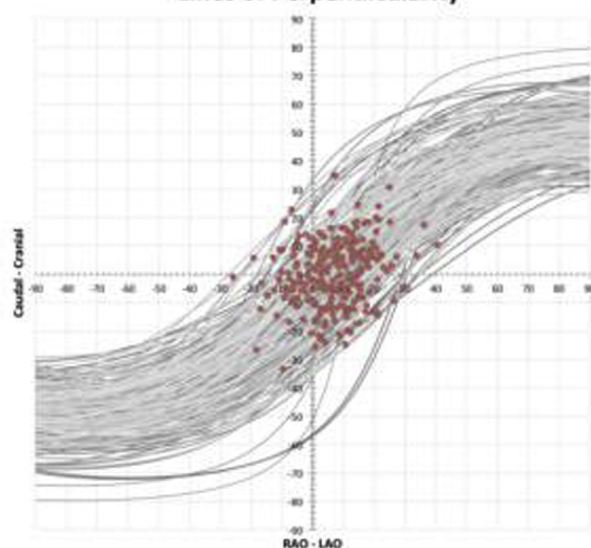
Background: The line of perpendicularity (LOP) represents all C-arm angulations that give an orthogonal view to the aortic annulus plane. Three of these are called "implanter's views" (IVs) as they are reasonable for implantation with one of the cusps being projected just in the middle of the two others. Our method allows a CT-based prediction of the LOP and IVs prior to TAVI.

Methods: 275 patients' CT scans were analyzed with multi planar reconstructions prior to TAVI. The cusps' lowest points were determined to define the annulus plane. The 3D coordinates of the hinge points were used to calculate the IVs and LOPs by using vector mathematics. All results were transferred into the common used LAO/RAO and cranial/caudal notation. Differences between angulations were quantified by calculation of solid angles that give the "real world"-deviation by combining LAO/RAO and cranial/caudal changes. All implantations were performed in the projection with the right-coronary cusp in front and middle of the two others.

Results: Predicted angulations were considered perfect for implantation without any corrections in 97.5% (n=268) of the procedures. In case of 7 patients, one (n=6) or two (n=1) corrections with following new angiograms were made. In these, the maximum difference between predicted and final angiogram was 14° (mean 6.2, $\pm 5^\circ$). Inter-individual variation was 40° to -28° in the LAO/RAO and 31° to -35° in the cranial/caudal axis.

Conclusions: Our method allows precise prediction of suitable C-arm angulations for TAVI. As inter-individual variation is broad, we recommend to predict angulations in each single TAVI case.

Lines of Perpendicularity



Lines of perpendicularity of 275 patients. The red dots indicate the angulations with the right coronary cusp in front and in the middle of the two others.

TCT-675

Comparison of Novel Centerline Versus Traditional Line of Perpendicularity Approaches for Determination of Optimal C-Arm Projection in Transcatheter Aortic Valve Replacement

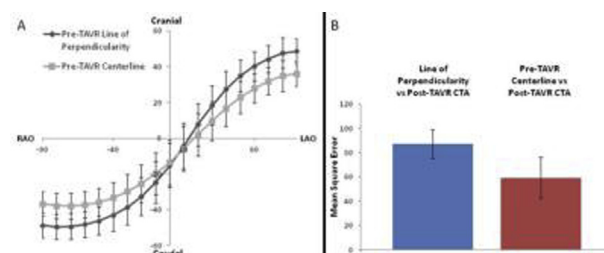
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Background: Procedural success of TAVR depends upon accurate device positioning. Study aim was to determine if corresponding c-arm angulations for TAVR utilizing a novel method of predicting angiographic deployment projections, centerline (CL), is more predictive of post-TAVR implant angulation than line of perpendicularity (LoP), the gold-standard.

Methods: 53 patients for TAVR underwent ECG-gated cardiac CTA performed prior to implantation with 20 patients having post-TAVR CTA. Determination of aortic annular plane (AA) with appropriate c-arm angulations was performed using 2 methods (HeartNavigator, Philips, Netherlands): LoP based on AA created from base of the coronary cusps; CL based on adjusted AA generated from a CL through the aortic root using a volume-rendered reconstruction. Cranio-caudal position was recorded, pre-TAVR, for each 10° increment of RAO and LAO where C-arm is perpendicular to AA determined by both approaches, as well as post-TAVR utilizing the basal plane of the CoreValve.

Results: Mean pre-TAVR deployment c-arm angulations assessed using the LoP and CL were calculated and plotted (Figure A; paired t-test, p=1). A strong correlation was observed between pre- and post-TAVR c-arm deployment projections using the CL when compared to the LoP approach (Figure B).



Conclusions: There is a significant difference in implantation angle using the traditional LoP versus CL approach. CL more closely predicts final post-TAVR angulations and could be considered the preferred method for TAVR. Further evaluation is necessary to evaluate the potential impact of CL and clinical events.

TCT-676

Determinants of Left Ventricular Mass Regression in Patients with Severe Symptomatic Aortic Stenosis Undergoing Transcatheter Aortic Valve Implantation

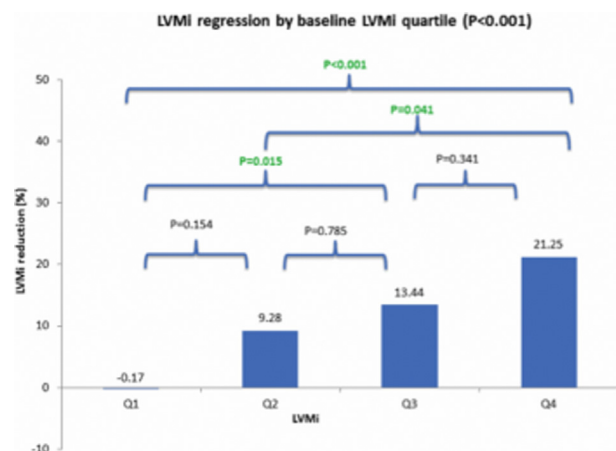
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Background: Previous studies have consistently demonstrated left ventricular mass (LVM) regression in patients with severe symptomatic aortic stenosis following transcatheter aortic valve implantation (TAVI). We sought to identify determinants of LVM regression following TAVI as we observed inconsistent trend.

Methods: We used our registry of TAVI patients. We retrospectively analyzed the indexed LVM (LVMI) calculated by echocardiography of 134 consecutive patients at baseline and 6-12 months following TAVI.

Results: There was significant reduction in mean LVMI (from 118.2g/m² to 103.4g/m², $p < 0.001$) driven by a decrease in left ventricular (LV) wall thickness. 47 patients (35.1%) did not demonstrate significant LVMI regression. This subgroup was characterized by lower pre-TAVI LVMI and lower prevalence of LV hypertrophy. However, these patients had no other unique characteristics. Higher LVMI at baseline was associated with greater magnitude of LVMI reduction. We did not detect significant associations between the degree of LVMI reduction and age, gender, systolic and diastolic LV function, pre- and post-TAVI transvalvular gradients, aortic valve area, bioprosthesis type (i.e. CoreValve vs. SAPIEN), pre- and post-TAVI grade of mitral and aortic regurgitation, co-morbidities and medical treatment. Pre-TAVI LVMI at the highest quartile was the sole predictor of LVMI reduction (OR=3.3, 95% CI 1.083-10.057, $p=0.036$).



Conclusions: LVM regression after TAVI is variable with LVM at baseline being the only predictor for its regression; where patients with the higher LVM at baseline exhibit greater LVM regression.

TCT-677

Abstract Withdrawn

TCT-678

Comparison of Invasive and Non-invasive Data of the Ratio between the Effective and Geometric Aortic Valve Area in Normal and Low Flow Patients: Overestimation of aortic stenosis severity by Doppler with Low Flow: A TAVR Study

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Background: The ratio between the effective orifice area (EOA) and the geometrical aortic orifice area (GOA) is known as the Coefficient of Contraction (CoC). The GOA is derived from planimetry of the valve orifice, while the EOA is highly dependent on flow and is obtained from both Doppler and Invasive measures. Patients undergoing TAVR undergo multi modality imaging as well as invasive studies. We sought to study CoC in patients undergoing TAVR in those with normal and low flow states as defined by echo (stroke volume index < 35 ml/m²).

Methods: Patients undergoing catheterization, CTA, TTE and TEE prior to TAVR were included. GOA obtained from TEE planimetry, EOA from Doppler using continuity equation and cath using the Gorlin equation and CoC was calculated (EOA/GOA) in normal and low flow states by echo (SVI $>$ or $<$ 35 ml/m²). LVOT area derived from CTA was substituted into the echo equation for Hybrid EOA.

Results: 21 patients were included in the analysis, 11 patients with normal flow and 10 patients with low flow (Table (1)). Compared to normal flow (SVI $>$ 35 ml/m²), patients with low flow on echo ($<$ 35 ml/m²), had similar cardiac output, similar mean gradients on catheter and echo, smaller EOA, larger discordance with catheter EOA, and smaller CoC.

Conclusions: In this study, patients with echocardiographic evidence of low flow (SVI $<$ 35 ml/m²) did not have low cardiac index on catheterization. Moreover, patients with normal flow have CoC of 1 by both Doppler and catheter suggesting that the EOA by either Doppler or Catheter are comparable and are both a good reflection of the true anatomical area of the aortic valve. However, with low flow on Echo, the CoC is 0.8 by Catheter and 0.6 on Doppler, suggestive that echo underestimated the true GOA and overestimated the AS severity. In this setting, hybrid EOA derived from CTA and Doppler may help rectify some of the Doppler data.

	All patients	Normal Flow	Low Flow
		SVI ($>$ 35 ml/m ²)	SVI (\leq 35 ml/m ²)
	Patients = 21	Patients = 11	Patients = 10
	Mean (SD)	Mean (SD)	Mean (SD)
Catheter Data			
Peak to peak gradient (PPG)	54 (19)	53 (21)	55 (18)
Mean gradient (MG)	42 (16)	44 (19)	41 (11)
Effective orifice area (EOA)	0.79 (0.27)	0.8 (0.23)	0.8 (0.23)
Cardiac output (CO)	5 (1.5)	5.1 (1.7)	5 (1.4)
Cardiac Index (CI)	2.6 (0.6)	2.6 (0.7)	2.5 (0.47)
Coefficient of Contraction (CoC)	0.86	1	0.8
Doppler Data			
Maximum instantaneous gradient (MIG)	69 (25)	75 (32)	64 (14)
Mean gradient (MG)	40 (13)	41 (15)	39 (11)
Effective orifice area (EOA)	0.71 (0.23)	0.8 (0.23)	0.6 (0.08)
Stroke volume index (SVI)	36 (10)	45 (6)	27 (4)
Coefficient of Contraction (CoC)	0.78	1	0.6
Other:			
TEE planimetry	0.91 (0.23)	0.8 (0.19)	1 (0.22)
Hybrid aortic valve area	1 (0.28)	1.1 (0.27)	0.9 (0.25)